

June 12. In the morning I went to the northeast through the ash covered woods and fields. The day was cloudy and the dreariness accentuated by the somber landscape on all sides. Fences and walls were covered by ash like dirty snow. From this direction two columns of smoke were distinct, one from the <sup>east</sup> and one from the <sup>west</sup> edge of the crater, the eastern one emitting thin smoke and some rocks, the western one a dense gray dust column. This continued until rain clouds drifted in from the west and obscured the cone.

In the afternoon the rain ceased for a while and while planting tubes in some fumaroles along the north front of the old lava, we found a new ridge of oxidized ash, formed, presumably the previous night, extending from the southeast and about ten meters high. Farther to the west, between two low hummocks for ash covered lava, one could see a small patch of rugged lava. This proved to be a new flow, issuing from beneath the ash ridge near the base of the cone, and flowing to the northwest to the orilla of Parícutin. It had already progressed several hundred meters and judging from its rate of flow, had probably broken out about mid-morning.

As it flowed down the steep orilla, its front became steeper and higher, until its slope exceeded the angle of repose of the loose black surface blocks, when the flowing front was completely bare and we could observe from within a very short distance the manner of flow. The advance of the viscous lava took place as slowly bulging lobes, giving the front a gross botryoidal surface, bulging and cracking like rising dough, the lower and principal lobe slowly folding under, incorporating within itself the loose blocks at the foot of the flow. As the bulges developed, they finally overcame the viscosity of the lava and masses of semi-plastic lava would tear slowly off and fall to the foot of the flow. The flow gave off sparse blue vapors but no odor, and the only sound of the moving lava was the clink of

the solidified blocks riding the surface of the flow. With considerable curiosity we awaited the arrival of the flow at the edge of the orilla, where there was a drop of some five meters into the arroya, expecting to see a fluid flow of lava, but the moving front did no more than tear into larger blocks, which rolled down

By noon we were ready for our departure. We passed the flow of June, still slowly pushing on, and the village of Paricutin, already a ghost town. Above the dark ash cloud extended far to the west, there to mingle with an approaching storm. To the right were pine clad hills, the trees brown and broken, the tejecotes weighed down by an accumulated weight of dust; and to the west, the cornfields black and velvety under a deep cover of ash. And from behind continued the rumble and roar of Paricutin.



June 9

This day began beautiful and clear, after the deluge of the night before that cleared the atmosphere of volcanic dust. The dust smoke plume of Paricutin was clear and sharply visible from Uruapan, with a long dark trail of dust clouds carried miles to the south by the winds.

At nine, fleecy clouds began to gather in all directions, as is usual in this region at this time of the year, but more so blow the long dust curtain. Compared to the vapor clouds, the dust cloud had a pinkish brown color. It was noticed then, as well as on previous occasions, that upon intermingling, the vapors maintained their identity until the two were thoroughly mechanically mixed. At 2 o'clock in the afternoon, approaching San Juan Parangaricutiro, one could see, through a gap in the encircling hills, the cone of Paricutin and its huge billowing column of smoke.

At 3 P M, while we were awaiting our horses and mules at Parangaricutiro a glance down the street of the town showed a marked decrease of the smoke to a thin languid column, that shrunk perceptibly as we watched, as if the volcano had been turned off and slowly subsided to rest, until, a half hour later there remained but a small wisp of pale vapor, accompanied by an occasional quiet burst of large blocks of rocks and an unnatural calm settled over the cone.

We arrived at the "campaniento" about 4 o'clock. The old lava flow of February-March was now completely covered by ash, except for the peaks and crags that projected above the surface or faced the edge of the flow, and the numerous fumaroles along the lava front gave off, lazily, their usual white or bluish fumes.

The rather tranquil state of the crater did not last long but soon the activity began to increase, gradually and almost imperceptibly, until at nine o'clock the explosive burst again following each other in rapid succession,



and Parícutin again became a wild, noisy monster. Huge masses of viscous lava were thrown high into the air, assuming many weird, usually elongated shapes: rods, club or mace shaped projectiles, some like boomerangs or T's, and a surprising number like birds soaring through the air. On falling upon the slope of the cone these broke into cascading fragments, or rolled like pin-wheels, casting fragments into leaping arcs.

The noise and confusion of the heavier explosions were indescribably tremendous, and was accompanied by blasts of air. The roar reverberated around the surrounding area like the roll of thunder and the fumaroles along the front of the old flow coughed puffs of vapor. At 12:10 AM the tremendous roar suddenly ceased. Expectantly we waited for the crater to continue. There was one last blast, then quiet. I went to the door of the cabin but could distinguish nothing. Everything was uncannily quiet. In a few minutes the dust cleared and a huge notch was apparent in the skyline of the cone.

Earlier in the evening I had noticed a slight drop in the crestline of the crater which by midnight had developed almost imperceptibly into a distinct sag which in the obscurity of the night carried no especial significance. At this time, however, something quite catastrophic had transpired, but what, would be revealed only by the morning light.

Shortly after this event, the crater broke into a magnificent display of fountaining incandescent fragments, silent except for the patter of bombs upon the volcano's slopes, and continued, intermittently until morning.

June 10

In the morning light, one could see that during the night a huge section of the cone, covering one quarter of its perimeter, had slumped down in terraces, forming a caldera-like arc in the flank of the previously symmetrical cone. The volcano was now very quiet, with only occasional bursts of rock bombs, but with its normal plume of billowing smoke, rising to a height of about 3,000 meters and a curtain of ash drifting with the winds to the west.



In the western point of the lowest terrace of the slide was discernible a patch of reddish oxidized ash with occasional falls of rock, accompanied by wisps of reddish dust, obviously an area in slow motion. At eleven in the morning red incandescent lava appeared. Its rate of flow was 30 meters per hour, but it soon ceased its advance. The high steep front of ash of the lower terrace also advanced slowly to the north by the continuous sliding down of ash and rock, and, although it advanced some few meters, no lava appeared along its face.

All day long Paricutin was in one of its more tranquil moods, with few bursts of bombs and the continued billowing plume of smoke.

At 7:40 P M there suddenly appeared near the northwest base of the cone a thin column of white smoke, too large for a fumarole and within the main portion of the old lava, where no fumaroles existed. Within a minute or two its base gleamed red and it increased in size and intensity. Believing that it presaged the beginning of a new crater, we hastened to the spot, encountering in our way an area of ash disintegrated and furrowed, like a deeply plowed field, and beyond found a low cliff of black lava, seamed and gashed by glowing cracks, and slowly disintegrating. Huge incandescent blocks rolled down its front and numerous trickles of small fragments streamed down its sides, and a few small streamlets of truly liquid lava coursed down in narrow stringers.

About 15 minutes after our arrival, a spot, about one meter across became more incandescent, changing from the glowing red of the lava cracks to a brilliant orange yellow, and began to work like leavening bread, and then to slowly flow. Slowly the moving area spread, and within five minutes the entire cliff, for a width of five meters had melted into a flow of brilliant orange, that advanced quietly past the small ash knoll on which we had taken stance. Now and then, from the incandescent surface of the flow, small pebbles shot up

with the hissing noise of the "quete" or skyrocket that is such a prominent feature of Mexican fiestas, and an occasional "remolina" or whirlwind spiralled up with such a rapid motion that they produced a whistling noise. By 10 o'clock the flow had spread over a large area, 100 meters or more across. By now the flow had slowed perceptibly and its surface was already black, except for the numerous cracks that furrowed it, but a second surge came, overriding the first, emitting copious white fumes and casting a pink and yellow glow upon them.

During this activity of the lava, the crater gave off billowing fleecy black smoke columns but few explosions, much as it had during the entire day, ~~during-the-entire-day~~, however, during the late night activity in the crater increased with spasmodic strong explosions.

June 11

A greatly changed scene was apparent next morning. The lava flow during the night had spread in several lobes to the base of the cerro Paricutin and had, by now ceased to flow. The smooth, velvety cover of ash, upon the old flow was tremendously disturbed and a high irregular ridge, pointing to the north had almost by miraculously appeared. At the time we did not realize the full significance of this and a later ridge.

500 meters: During the day eruptions from the crater were frequent. It appears probable that during the night the cessation of the lava flow was followed by increased activity from the crater.



We made a circuit of the cone and found the south side entirely intact. The forest nearby was battered and broken by falling bombs and the ash covered the pines beyond the whorl of lower limbs. Beneath the spreading oaks were mounds of ash, a meter or more above the general level. All about was smooth black ash, pitted by bomb craters, silence and destruction.

At 4 o'clock we reached Paricutin and found the townspeople, in groups, (inexcoriation? inexcortication?) watching the slow, inexorable/advance of lava upon their lands, or in feverish preparation to abandon their homes. A scant 80 meters separated the lava front from the first casita, blessed crosses placed before it to ward off the impending destruction.

The town, itself, was in a sorry state, the smaller dwellings largely buried, roofs and trees broken from the weight. of wet ash, the church in ruins from the constantly recurring earth tremors, the people disconsolate at the thought of abandoning their "tierra."

All during the day, the volcano was relatively quiet. A continuous column of smoke rose from the crater with the sound of a high surf, beating on a rocky coast. At night the bright red cascades of the flowing lava continued and dense steam clouds from the fumaroles clung about the old lava. The sky was deepest aquamarine and the whole effect was wierdly fantastic.

June 15.

In the morning we went to Paricutin. The flow had progressed but 60 meters toward Paricutin but had advanced more rapidly to the north. A number of weak fumaroles had already formed, yielding thin white, yellow or orange crusts.

The east flow, although advancing more slowly, had spread into one of the small valleys. At night the glowing cracks in the lava front from a distance resembled the lights of a city from a far-off hill.

At 10 o'clock the flow of lava increased, accompanied by spurts of liquid

lava at its point of origin which threw blobs of liquid lava 50 meters into the air. The north crater is being rapidly filled by ejectamenta from the south crater.

June 16

I spent most of the day in collecting samples from the fumaroles. They look ridiculously like open mouths of fishes from which issues languidly long rising plumes of bluish vapor, clinging to the ash slopes, drawn to the cone by the convection of the central dust column. Before the ash began to fall in large quantities on the night of March 21, the lava front was a steaming jumble of jagged rocks, completely untraversable. Now it is a group of rolling, velvety hills where one can wander as one wills. By contrast, the new lava has a gently rolling appearance; in detail, however, it is a litter of contorted masses of harsh lava blocks. In time, probably, this surface will be metamorphosed in appearance as the still viscous lava beneath forces the solidified crust into pinnacles and crags.

Some of the fumaroles are beautiful! An orifice, perhaps below a low overhanging rock, covered by velvety ash and surrounded by zones of white, orange, yellow and pale green salts. From the throat rises a languid plume of fluish white fumes.

The north crater is now almost completely filled by the ejectamenta of the south crater, but at 3:40 the north crater again entered into eruption giving off a thin column of ash, while the south crater continued ejecting huge fragments of lava and a dense column of ash.

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June 17 was a day of great activity beginning with heavy explosions from the south crater, of large blocks and little smoke. The north crater is now completely filled and its north wall entirely obliterated but below it there has made its appearance a low black cliff, from whence, from time to time incandescent blocks sloughed off.



June 17 - continued

Borbetones

At 10:20 AM - sudden jets of lava appeared immediately behind the pyramidal remnant of the break and lava began to flow, like a huge tongue down the steep slope  $\phi$  to the west. A second surge immediately followed coalescing with the first. Twenty minutes later came a tremendous burst of huge molten masses from this spot, spreading rock and black ash into a huge fan. The tremendous explosive bursts continued all during the day at periods varying from ten minutes to four hours.

At 2:04 P M, a new lava vent opened above the last one and sent its lava to the east to join the previous flow. Fifteen minutes later the low cliff began to leak lava, and immediately below a tremendous cascade flowed rapidly down the west slope. A few minutes later a new spurt appeared, apparently more viscous and flowing more slowly, rolling slowly over and over and upon reaching the steep slope of the terrace broke into huge balls that rolled like fiery snowballs to the base of the cone. During the night the lava surges frequently broke up in this manner. During one such surge the entire front of the lava tongue tore off and rolled down in one <sup>enormous</sup> tremendous incandescent mass.

At 6:27 PM the north crater reopened as a small throat, perhaps three meters across emitting smoke and "flame" at great velocity, like a bessemer converter.

Perez - Panas notes

The tremendous (disquietude) activity centering about new throats has gradually destroyed the pyramidal hill, and the continued blasts from the south crater has worn down its north rim, until what previously appeared as a low cliff had now developed into a huge black plug, two "ears" giving it an owl-like appearance. Although seamed by glowing cracks and battered by bombs, it persisted, changing its shape only slightly, so there was no doubt that it consisted of firm solidified lava. No doubt this represented

June 18

At 12:25 a huge crest of lava appeared without warning, advanced slowly from a source below the new vent, moving phlegmatically along the summit terrace, a front of incandescent lava, perhaps ten meters high. As it reached the edge of the terrace it raced suddenly down the slope, spread out in a sheet at the top of the lower terrace, and again raced down the slope of the lower terrace in a broad sheet. In fifteen minutes it had reached the east base of the cone, a distance from its origin of perhaps 400 meters. By this time an offshoot, perched on the steep slope of the lower terrace had congealed to the point where no further flow was perceptible and the surface, <sup>few</sup> a/minutes before a broad uniform belt of glowing orange, was now almost completely dark indicating that the flow, in spite of its rapid advance, was in fact not much hotter than the congealing temperature.

This flow was followed by increased eruptions from both the south crater and the new vent, the south crater quietly, although ejecting much material to a great height, like a tall slender christmas tree, the latter, giving off with a rushing roar "flames", black smoke and occasionally small stones. et-2-AH-



At 2 AM, the activity abated somewhat but within one half hour was renewed with fierce violence, both craters in simultaneous, almost continuous bursts, hurling material far into the air with a grating roar that set the hills to rumbling, until the whole northern break was an almost continuous sheet of incandescent ejectamenta. At 2:28 AM, a new orifice appeared at the spot where the plug had been. The ejectamenta rushed from a throat 10-15 meters across, like a huge blowtorch, rushing continually with a  $\gamma$  reverberating grating roar. Lava poured down the east flow. We stood in a curious mixture of amazement and anxiety, fascinated by such an almost incomprehensively fantastic display that set the whole of Parícutin aglow, casting a pink glow upon the fumarole vapors that drifted so lazily about its base. Fifteen minutes later the display continued unabated but by dawn had subsided to irregular periods of violence.

By noon, we were ready for our departure. The new vent still roared intermittently, simultaneously with bursts from the main crater. As we passed the north edge of the old lava front, one flow beneath the ash had reached the old lava front and was spilling huge boulders down the slope.

We passed the village of Parícutin, already a ghost town, <sup>across the corn</sup> fields, now buried beneath velvety black ash, the boundary rows of maguey lifting their ash covered leaves to the sky. To the right hills covered with brown and broken pines, to the left smooth ash covered fields outlined by bordering maguey rows and broken tejecote trees, ahead the gray towers of Parangaricutiro's church. And from behind came the rumble and roar of Parícutin above the dark ash cloud drifting far to the west.

These enormous explosions were presaged by a sudden vivid red cast upon the smoke cloud and accompanied by a most curious phenomenon I am at a loss to explain. Immediately following the glow, there shot up, almost with the speed of lightning, a striking arc of yellow light, rising like an aurora, appearing

and disappeared so rapidly that it was uncertain from where it had come or whence it had gone. Tremendous irregular orange colored lava quickly followed and then fell, for the most part, back into the crater.

With considerable trepidation we cautiously climbed a ridge of pushed and scrambled ash that shut off our view of the actual source of lava and looked down upon a stream of rock that seemed to have no apparent source. The dark rugged surface blocks, riding on the glowing lava, filed slowly past like soldiers on review.

By August this ridge had grown to such an extent that the area was totally unrecognizable. Its terminal front was now about 100 meters high. Remnants of bedded ash crowned its summit. ~~It is a~~ Its form was a mass of huge blocks and sharp spires and from its sides occasionally rolled incandescent blocks of rock. From these slides arose a billowing pink to reddish billowy dust of oxidized ash. Its terminal front was seamed and gashed, and broken into huge blocks and sharp spires. These slowly disintegrated by spasmodic trickles of incandescent fragments or the fall of huge red blocks, its entire face in continuous change. Occasionally small lobes of viscous lava bulged out and at one time what appeared to be low flames broke out in a crevice of a huge pinnacle. Obviously the ridge was a slow advance of viscous lava, advancing under the cover of ash, the ridge increasing in height, as well as advancing toward the north. Three flows broke out from its western flank, like pigs from a sow, one on Aug. advancing as a huge flood, carrying along huge blocks of solidified but still incandescent rock.

Sitting on the ash slope, nearby the flowing lava, one could frequently hear a dull crack from below the ash and feel a distinct shock as the soil and ash mantle of the surface gave way under the steady pressure of the advancing lava and small pressure ridges were formed.



May 21, 1943

Arrived at Paricutin. The cone has grown considerably since I saw it in March with Ing. Ordonez and appears to be more active. Present height 350 m. Fumarolic activity in the old flow has diminished, probably due to dampening by the ash that has fallen upon them. The lava is no longer flowing.

Some rain.

May 22.

Went along the north and east edge of flow. In the swale, below Dr. Atl's house, where fumaroles were so abundant in March, there are now scarcely any. Crossed over the top of the old flow, examining fumaroles along the western edge of the old flow. There are not as many here as along the eastern front. In the pinnacles that project above the cover of ash, are orange and yellow salts, and the fumaroles have a strong smell of hydrochloric acid. Reached the base of the cone, where there were numerous bomb craters, some of them still hot. Followed along the west front of the flow where I found an area of ash covered by a thin white efflorescence of salts, presumably ammonium chloride and other salts dissolved from the ash by yesterday's rain.

Set up a funnel and a tube in a small fumarole near the northwestern front near the crest of the old flow. Water immediately condensed in the tube. Three hours later a crust of salts had formed in both the tube and the funnel. At 5:30, began to rain heavily and the front of the lava began to show much steam, with a little from the summits of the two peaks on the lava flow, but none on the top of the lava. The heavy rain came from the west and the western slope of the cone became covered with clouds of steam that rose up the slope and were sucked over the crater rim.

Good night display, but not equal to yesterday's.

May 23.

Went to the funnel and tube. The tube was crusted with a white sublimate in fine needles and botryoidal masses. The upper part carried some condensed water having a slight saline taste. The funnel carried a crust of white salts with streaks of pale yellow. There appeared to be some condensation in the water-bottle, with which the funnel was connected and the contained water had a slight saline taste.

Later went to the east side of the flow to study some fumaroles but some bombs fell close by, dropping with a swishing noise. One that fell nearby, having a diameter of about 10 inches had a surface temperature of 202°C. Began to rain, so returned to the casita.

Observed a long streak of steam down the side of the cone, reaching almost to the bottom, as if a small stream of water had run down, and later another smaller one.

At 6 PM, very hazy, with later dense steam clouds from the fumaroles drifting to the east and filling the basin, with fog.

During the night heavy falls of large blocks from the crater many of which came quite far out, accompanied by heavy drumming of falling rocks.

May 24.

Fine clear day, spent mostly in photography. In an old dead pine tree near the lava flow found two squirrels, apparently contented. Later a blue jay came and fought with one of the squirrels. Caught insects upon the ash, many leaf-hoppers, some spiders, a large grasshopper, a longicornis and others. Saw one sulfur butterfly and later a large bright one. Also saw large lizard scamper between the blocks of the old lava. In the afternoon took colored pictures of some of the fumaroles.

The volcano was magnificent at night.



May 25.

Ash falling at the casita so decided it was clear to the south. There, however, the ash was worst, falling constantly and the falling blocks raised much dust from the old ash cover. Soon began to rain, some mud, so began to return. The fall of ash consisted of porous material up to 4 inches in diameter. All, except the larger fragments, appeared to be colder than the surrounding atmosphere. We all agreed that the ash was chilled. Much more ash to the south than to the north. The pine trees were covered above the lower branches. The large oaks had mounds of ash beneath them where the numerous twigs intercepted the ash and built up hummocks. These mounds sometimes reached a meter and one half above the general level of the ash.

Found a bluejay with a broken wing, perhaps hit by an ejected fragment. Found Tako's house, now covered by ash up to the ridge pole. Luis estimated that the ash was about 2 meters deep.

May 26

Cloudy with the wind from the northwest. Spent the day collecting specimens. In the fumaroles below the casita dug below the ash into loose blocks and found beautiful trapezohedral crystals of sal-ammoniac. Collected in the iron fumaroles to the west. A large one, with a golden brown, feathery incrustation had a very strong odor of hydrochloric acid. Scrapped off the walls for material for analysis. Dug out some others and found that good material had formed below the blanket of ash, good crystals of ammonium chloride, also feathery, skeletal crystals as delicate as snow crystals; yellow deliquescent crusts, and minute crystals of an orange-red color.

June 9.

8 AM - Uruapan. Beautiful clear day. The smoke cloud of Paricutin beautifully visible as a tall plume, with the ash cloud extending miles to the south. From Uruapan, to the top of the smoke column had an angle of  $19^{\circ}$ . By 9 o'clock clouds began to form below the ash curtain. (Photo)

11AM - Arrived at the old campamienta. From here the cone was rather highly inclined, the high side of the crater to the south. Clouds had formed in many directions, particularly to the south in the direction of the smoke drift. Compared to the vapor clouds, the ash cloud had a pinkish brown color. (Photo)

2 PM - Approaching Parangaricutiro, had a good view of the volcano, with its large, well defined and normal smoke column.

3 PM - While awaiting our horse at Parangaricutiro, noticed the smoke column diminish to a thin, lazy column of smoke.

3:30 PM - The smoke column has dwindled to a relatively small wisp, sometimes hardly discernible and it began to look as if the volcano was about to enter a phase of quiescence. There were occasional ejection of large blocks from the crater but without any noise.

This condition continued to about 8 PM with only small bursts, chiefly lathe blocked, slight dust column with occasional weak bursts of smoke, but gradually increasing in intensity and frequency.

9 PM. Bursts increased in intensity, ejecting large blocks but little smoke. Bursts  $1/2$  to 4 seconds apart, some of the large blocks taking 12 seconds to fall from their ultimate altitude.

During the period of large blocks these masses showed many irregular and curious forms, elongated shapes, such as rod, mace, boomerang, club, hammer, T's and bird shapes.

From 9 to 2 AM, the crater was in tremendous activity, with rapid and huge bursts of brilliant hot lava and tremendous noise so that the surrounding hills reverberated and rolled with the sound. During this period we observed a number of brilliant displays of "flashing arcs" that rose from the crater and sped, almost with the speed of lightning into the clouds above the crater.



These were immediately followed by huge irregular masses of orange colored lava, which falling upon the slopes of the cone made brilliant cascades of glowing rocks. (Note: During the daylight hours the ejected masses showed many irregular, elongated shapes) These arcs gave advance notice by a vivid lighting of the ash cloud above. The arcs were accompanied by tremendous roars of noise and blasts of air, sometimes sufficiently strong to blow open the door of the casita.

June 10 -

12 AM- A vivid electrical storm to the southeast of the volcano.

2:10 AM - The tremendous roar of the volcano suddenly ceased, there being one last tremendous blast about one minute after the general roar. After this last blast I went to the door of the casita but could not make out the cone. Everything was ghostly still in the striking contrast to the tremendous din a few minutes before. In a few minutes I could perceive a large dust cloud and an occasional incandescent rock rolling down the cone's side. When the dust cleared a huge notch was evident in the profile of the cone.

Earlier in the evening (about 9 PM) I noticed an almost imperceptible offset in the north rim of the cone. This can be seen in one of the photographs I took at that time. At 12 AM this had developed into a perceptible sag.

Immediately after the lifting of the dust clouds there was a beautiful fountain of incandescent rock from the crater, the bursts following each other in rapid succession, most of them without noise except the pattering of falling rocks upon the cone, or at most feeble noises. This continued until the next morning.

In the morning (June 10) one could see that a large section of the north side of the cone had slid down forming a huge caldera-like cut in the previously symmetrical cone. The break covered about 45 degrees of an arc of the original cone. The east and west breaks were sharp, with steep walls, and the slumped portion stepped down the terraces (two long ones). The crater was very quiet with only an occasional burst of rock, but with a normal smoke cloud.

The lowest terrace, beginning at the east break in the cone sloped about 5 degrees to the east. The western and lower end showed an area of reddish oxidized rock and an occasional fall of rock accompanied by a reddish dust. This portion was obviously in motion and at 11 AM flowing lava appeared. The lava front advanced about 30 meters per hour at the beginning but soon slowed down. At 3:45 PM it had advanced about 50 meters. The height of the lava front, where it broke from its ash cover, was about 15 meters high and at its flowing front about 3 meters.

The front of the lower terrace, with an angle of repose for the loose ash cover, also advanced slowly to the north by the continuous sliding down of the ash, as the front slowly advanced.

The lava itself, advanced by large blocks breaking off and rolling down the front and by the almost fluid-like trickle of red hot fragments that continually spalled off. The lava front was red only in the cracks and disintegrated with a continuous crackle to which was added the tinkle of sliding rock fragments. The color of the hottest lava was orange red. No visible fumes were given off and there was no perceptible odor.

The volcano was quiet all day with only smoke column.

7:40 P. M. There suddenly appeared at the northwest base of the cone, a thin column of white smoke, larger than the fumaroles and within the main portion of the old flow where there were no fumaroles. Within a minute or two the base of the smoke column appeared red, increasing rapidly in intensity. We immediately hastened to the spot, crossing on our way an area of greatly disturbed ash and some pressure ridges, and found a low cliff of rock with



brilliant incandescent cracks slowly disintegrating. Large incandescent fragments rolled from the front and there were numerous streams of small incandescent fragments running down its surface which were difficult to distinguish from true liquid flow. A few small streamlets of true liquid also flowed out.

About 15 minutes after our arrival at the spot, an area about 2 meters in diameter became more incandescent and began to work like thick dough. This continued for about a half minute when it began to flow like thick molasses and within a few minutes a front, 5 meters across was in liquid motion and flowed like molasses down the slope. The lava stream had a light golden yellow color and flowed without noise or odor, casting a pink and yellow glow upon the sparse vapors that arose from its surface and lighting up the night like bright moonlight. A curious phenomenon was the ejection of incandescent pebbles from the surface of the flow with a whistling noise, like that of a skyrocket.

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The flow began behind a ridge, the opposite side of which showed pressure ridges for a distance of 50 meters. At the edge of the lava flow, about 50 meters from its apparent source was a peak of lava, with much incandescent areas, and which was in a state of disintegration.

8:30 - The actual flow of liquid lava began.

10:00 - We returned to the flow after coming to the casita for films. By then the flow had spread over a large area, 100 meters or more across. The flow was slower, although another overriding it was advancing more rapidly. The flow front was about 2 to 2 1/2 meters high. The upper surface had already darkened, but the advancing front was red. Copious fumes were given off from the hotter area behind, and the glowing lava cast a pink and yellow glow upon them.

At the hot hill observed a curious occurrence, a small whirlwind, in very rapid circular motion, giving off a whistling noise. Thought it was escaping gases, but it began to move, covering an area of 5 x 5 meters - lasted about 2 minutes.

June 11

Fairly clear in the morning, but clouds forming early. Rained at noon. Smoke plume normal.

From the casita very little apparent activity at the two flows. No fumes from the first, and little from the second.

2 PM - Activity from the cone decreased. Almost continuous growls, but little smoke, sometimes none. Opposite side of cone visible through the gap. Fairly large blocks thrown up, but none above the crater rim.

3:15 same, but glow of hot ejectamenta frequently visible in crater gap. Observed a slender brown dust devil over flow #3.

3:20 - Activity increased somewhat with more incandescent blocks thrown out. It seems that the previous apparent lack of relationship between blasts and rock ejecta is that in many of the rocks did not reach the crater rim.

3:25 - Observed two blasts, one that followed the other one second after. The first from center of the crater ejected hot blocks, the second from the west portion, thick black smoke.



June 12 - Rain most of the day.

In the morning went northeast of the casita. Set up the camera in a broad open valley and soon noticed that there were two columns of smoke, one, apparently west of the other, gave off dense gray smoke, the nearer one less smoke and some rocks. Observed these 2 columns a number of times until clouds obscured the cone.

At 2:30 rain ceased for a while, so planted the tubes in fumaroles. In the "valley" opposite Dr. Atl's house noticed a new ridge of pushed up, oxidized ash, extending from the S. E. and reaching about 30' high, and further on a section of new lava flow between two hills. This proved to be a new flow, issuing from beneath the ash near the original flow, flowing to the north-west, to the orilla of Paricutin, then down the orilla.

When we returned to the casita, there was little smoke from the cone, and one could clearly see a larger crater in front, with a second one behind, separated by a high steep medial ridge. The north crater was entirely quiet, but the second one was in active eruption.

Night: A fine display from the south crater, throwing small rocks, sometimes 1,000 meters high and often showing black smoke with incandescent streaks. This eruption was comparatively quiet, with no other sound than the swish and impact of rocks. Continued so until we returned- retired.

Returning from the flow in the night noticed a number of new glowing spots in the old flow. These appeared to be, not new cracks developed by the push of the new lava, but rejuvenation of already existing fumaroles.

June 13. Cloudy and rain.

Daybreak. Tremendous grating roar, occasionally crackling roar, continuous without interruption except for very rare periods of one half minute of complete silence. The continuous vibrations of this noise was perceptible, sometimes strong. A small smoke column, and apparently small stones shot up in a swift and continuous stream like a geyser. Appears to be due to almost continuous escape of gases. All this from south crater. North crater dormant.

Don Felipe came in some agitation to tell us Paricutin was threatened by the flow. When we arrive found the flow had advanced well beyond the old flow and was flowing down the barranca at a rate of 25 meters per hour and laterally at only 2-1/2 m. p. h. The canyon is about 6 meters deep and four wide. Character of flow similar to yesterday. Faint bluish fumes from lava surface. No smell. Quiet flow. Planted some fumarole tubes.

June 14 - Cloudy.

During early morning hours much irregularity in noises, sometimes roars, sometimes like high wind and occasional tremendous bursts. One very strong one at 2 AM.

In the morning one could see a new lava flow, cascading rapidly between a small pyramidal hill at the base of the north crater, and the eastern wall of the break and flowing between this break and the lowest terraced to the base of the cone and beyond. The point of exit was about 75 meters below the lip of the crater, behind the pyramidal hill. Some additional slumping took place around the lip. The lava gave off bluish fumes sometimes tinged a brownish yellow.

The south crater gave off continuous smoke cloud, accompanied by an occasional roar, and puffs like those of a locomotive starting. At intervals the north crater gave off faint bluish or brownish smoke and at rarer intervals bursts of incandescent rock and black dust clouds.

June 13 - contd

The flow was advancing to the east, at the foot of the cone at 15 meters per hour, into the destroyed pine forest.

Made a circuit of the cone. The south side entirely intact. Remarkably how few bombs collected at the base of the cone, the talus not more than one to three meters high.

Noticed many flat slivers of compact basalt in the ash. Also large bombs with trains shooting out of crater. The bombs, upon impact also yielded such slivers. Perhaps due to disintegration of the compact bombs, during flight.

4 PM - Arrived at Paricutin and found the lava advancing on the village. Only about 80 meters from the first house, advancing at rate of 21 meters per hour. Many houses being dismantled and moved. After passing through the narrow valley, the flow spread, advancing but little to the north, more to the west, but mostly northwest.

6 PM - A slow column of smoke rising from the cone, with low surf sound and continuous slow locomotive puffs, perhaps the latter from north crater. Beautiful bright red cascade of lava from mouth alongside pyramidal peak. Dense steam from fumaroles drifting to the east.

Eruption rather quiet all day, increasing about 9 PM to normal display.

June 15

Went to Paricutin in the morning. The west side of the flow was within 20 meters of the first house. The advance was greater to the northwest toward San Juan, but its advance in all directions was slow. A number of weak fumaroles were already formed (24 hours after flow) yielding thin white yellow and orange crusts. Paricutin was being dismantled and evacuated. In the afternoon plant some sublimate tubes.

Later went to east flow. This has spread between the old flow and the hills to the east. In general the flows follow the slope but they override small ridges by flowing up hill. The east flow is thicker than the west flow and is advancing more slowly, 5-10 meters per hour depending on the slope. It is a viscous lava, bulging out in breadcrust fashion, or rolling boulders off its face. No odor, little fumes, no noise except that of sliding rock.

Evening. Magnificent display from crater and flow. The latter two cascades of brilliant orange from the boca to the base, then a myriad of lights along the flow front, like looking upon a city from a distant hill. The hummocks with glowing cracks like outlying villages.

9:50 - The boca of the flow began to spurt with locomotive like sound. Lava bubbles, estimated as 5 meters high formed and burst, sometimes accompanied by increased flow of lava from boca, throwing hot gobs 50 meters high. During this period, the north crater resumed weak activity, throwing out small rocks and incandescent dust, accompanied by much black smoke at intervals or sometimes a thin wisp of smoke. It appears that the north crater is being rapidly filled up by ejectamenta from the south crater.

The west wall of the break is being built up, the east wall much in its original condition. Very few rocks now fall on east slope.